APPENDIX C

Excerpts from

TROY FIRE DEPARTMENT
STRATEGIC STUDY
2003

Conducted by
Architectural Resources
Corporation

EXECUTIVE SUMMARY

INTRODUCTION:

In the presentation of the Troy Fire Department Strategic Plan to City Council, an effort was made to stress the fact that this Strategic Plan focused on the Fire District of Troy not just the City of Troy. The plan is also based on long term needs, trends and high risk areas of the community, and the Fire Department's ability to respond effectively to emergency calls. As such, it is also necessary to say that our specific recommendations are also based on full-time service being provided from each facility evaluated in this plan. This is more than an assumption or for the convenience of analysis for the report. It is a necessity of the fire services in any urban community to be able to maintain an effective response time throughout its Fire District twenty four hours per day, seven days per week for every week of the year.

FIRE DISTRICT:

The legal fire district of the City of Troy is the legal city limits of Troy, Concord Township, Staunton Township and EMS only to Casstown. Mutual aid is provided to the many communities and townships across a very large area around Troy, including Tipp City and Piqua.

EXISTING FIRE STATION FACILITIES:

With the exception of the west side station (#3), the existing station is undersized and lacks appropriate configuration, resources and quarters for full-time operations and crews.

INFRASTRUCTURE (ROADS AND UTILITIES):

Plans to continue road and other utility improvements should be aggressive and continuously pursued. Good, effective and redundant roadways improve all emergency safety and response times for fire and

police, and good water distribution throughout the city and high risk areas of the overall fire district provides an effective extinguishing agent for the Department's use in fighting fires.

GROWTH:

Since this strategic plan focuses on long-term needs, the anticipated growth of the community is important to the decision making involved in locating fire and EMS facilities in the community. Almost all types of building use groups are represented in all directions around the city. This development pattern of the Troy Fire District is already well established. The rapid growth and future configuration of the area is clearly indicated in the Cities Comprehensive Plan.

RESPONSE EVALUATION:

Although the Department works very hard at maintaining the best response possible, it is physically impossible to cover significant parts of the City, let alone the Fire District, within critical response times due to the location of and number of stations, equipment and crews.

RECOMMENDATIONS:

It is our recommendation that the improvements that should be made with the Troy Fire District be phased in over time, and balanced with the available resources of the communities, since the need already exists. A sequence of station changes would provide continued improvements from the existing configuration, to a six station configuration. With anticipated long term growth, additional stations should be added. The sequence of phases depends on which areas develop most aggressively and when the overpass and connector roads are done.

Generally, we expect the far northeast station (Site #203) to be the last in the sequence. This is primarily due to the extent of underdeveloped land in this section. The relocation of Station #2 is first. It will locate east to Site #208. Three other stations are also identified. They serve existing development as well as growth areas. Because of this, these additional stations should be put into service as soon as the growth and funding justifies it. These station sites are north central (Site #302), south (Site 402) and southwest (Site 103).

Once the south station is in place, the existing Station #1 can be converted to a support facility. This would house headquarters, training center, reserve and specialty equipment.

The full sequence of the Fire Department's development, the estimated cost, and options are described in Parts 2 and 3 of this report.

PART 2

EVALUATION & STRATEGY

- Fire Station Location
- Connector Roads
- Strategy
- Evaluations

FIRE STATION LOCATION

The general axiom for fire station location issues is, the smaller the service area, the better the coverage. The ISO, which only considers fire issues, recommends an optimum service area of 7.4 to 9 square miles, which roughly corresponds to a 1.5 mile radius area. Specific physical characteristics and infrastructure configurations of most communities make these references ineffective in optimizing station locations. Consequently, actual response times and distances are simulated based on future characteristics for this study. Stations located at or very near the recommended sites best accommodate the planning objectives that we follow for all communities. These objectives are as follows:

1. Cover most of the city within an average six (6) minute area for fire protection.

2. Cover all of the city with an average eight (8) minute area for advance life support (ALS) coverage.

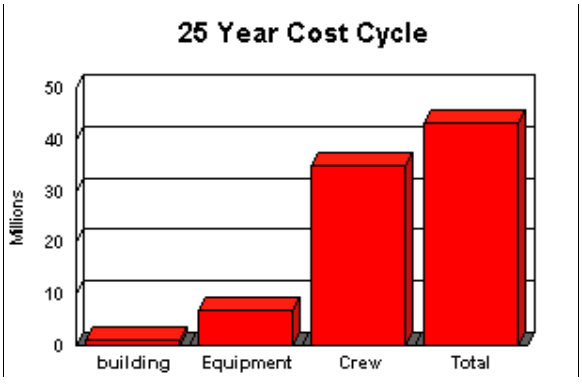
3. Cover as much of the city's core and high-risk (life, property and business) area within an average four (4) minute area for basic life support (BLS) and fire.

4. Cover as much of the city's core (high and large structures) with the ladder truck and related equipment within the ISO recommended two and one half (2½) mile radius.

5. Locate stations to provide response area overlap in the highest risk areas to provide efficient access from multiple directions, and provide the best redundant coverage for getting large numbers of equipment and personnel to a site in the least amount of time.

6. Use of automatic mutual aid (AMA) to enhance response times and to enhance redundant capabilities throughout, where possible.

One important consideration in determining the number of facilities necessary in providing fire and EMS protection within the community is the overall cost of each of the facilities. As indicated in Figure 9, the initial building construction cost is a small



FACILITY COSTS

Figure 9

percentage of the total 25-year life cycle cost of the facility. The facility construction is often less than 20% of the total cost spent on equipment for that facility, and can be less than 4% of the cost of manpower for that facility over the total life span of the facility. Although these percentages are representational, the availability of part-time or volunteer crews and labor negotiations can have a significant effect on the actual costs for any community. Regardless of the specifics, the ongoing equipment and operational costs are high, and they continue to escalate. Because of this significant long-term cost for each facility, it is important to distribute the facilities in a way to obtain the largest and best service coverage with the least number of facilities while minimizing overlap between these stations.

To establish accurate response areas, a computer simulation program was used. A series of routes, identified by our office, were used by the fire Department to identify existing travel times. This data was then used to calibrate this simulation. The maps generated by the computer simulation are all in the same format. The current fire district of Troy is highlighted with a heavy dashed red line. The roads shown on the map are color coded based on their time distance from a station. Each station site is given a unique number and is circled in black to highlight its location. The color coding on the road represents three (3) different time distances. The roads that are rendered in green are within a four (4) minute response time, roads rendered in brown are from four to six (4-6) minutes, and red from six to eight (6-8) minutes. Roads shown as a black line are outside of the eight (8) minute limit on the Travel Time calculations. Other map features also show purple lines representing railroads and blue lines representing water ways. The maps show distances and time data based on average conditions. The day of the week, time of day, seasons, road and utility work, and special events in the area can all have significant effects on the actual response time and distance.

Consequently, the base map (titled: “1” in Figure 10) created from the calibration data, shows the distance under average conditions that can be covered in four (4) minutes travel time from Station #1. Similar maps were developed for Stations #2 and #3. It is important to note two issues with this map.

First, the irregular shape "bubble" defined by the heavy black line around the green street colors at Station Site, shown on the Figure 10 map is actually a very dynamic element. This bubble is dynamic in the sense that during daily, weekly, and seasonal cycles, the bubble can collapse to a very small area around the station, and it can expand to an area significantly larger than what is shown on this map. The smallest area may represent rush hour traffic during bad weather conditions. The largest coverage area may be represented by responses made in the middle of the night during good weather conditions.

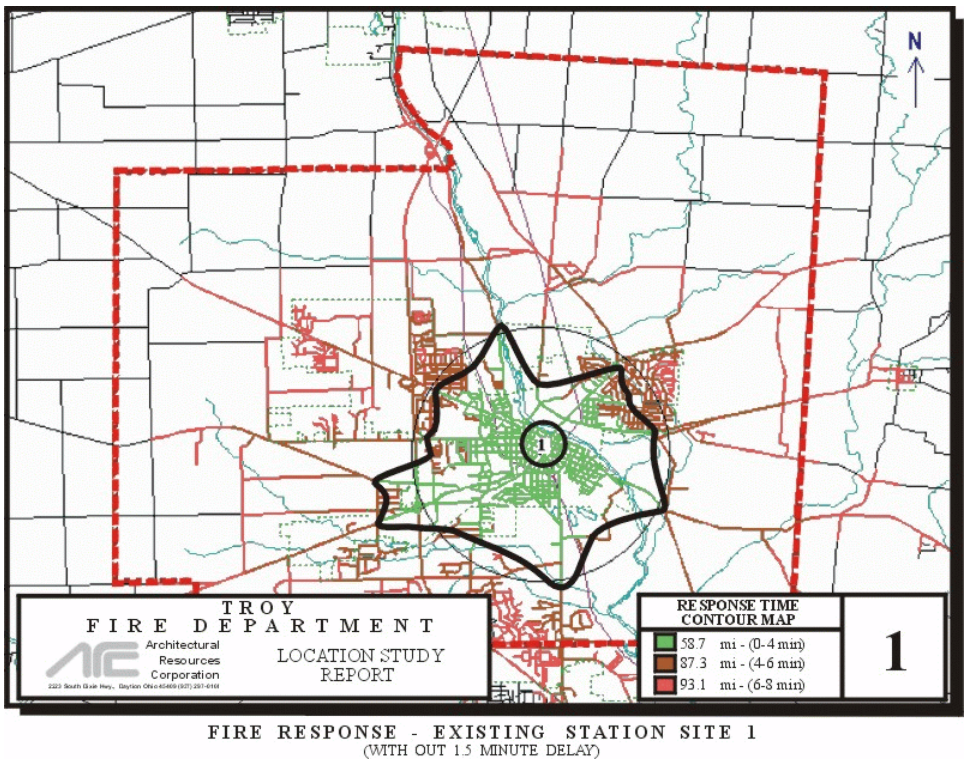
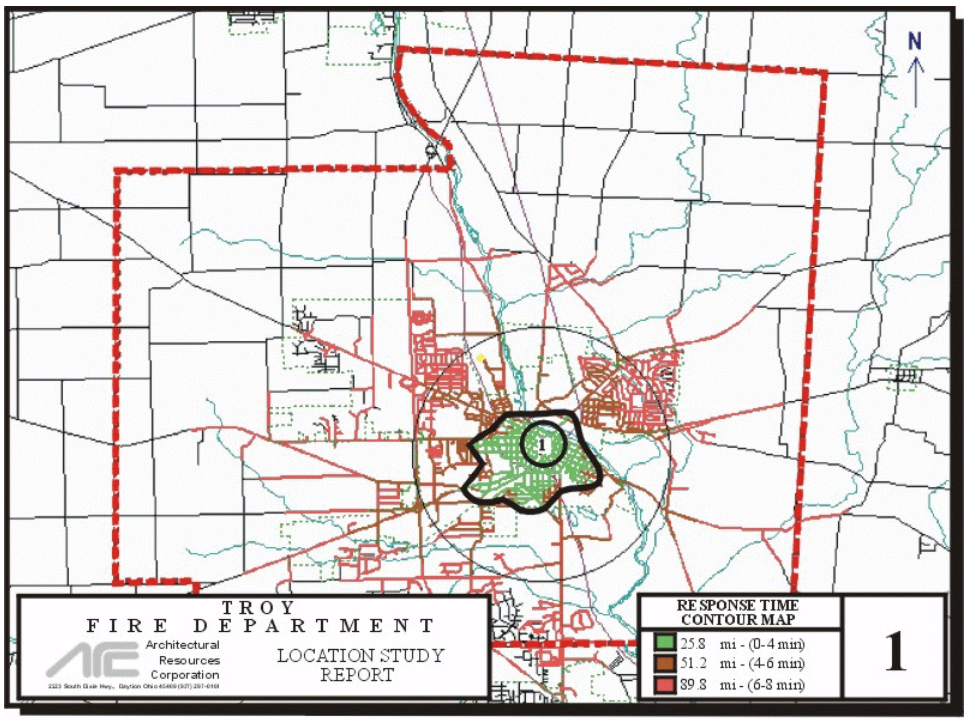


Figure 10

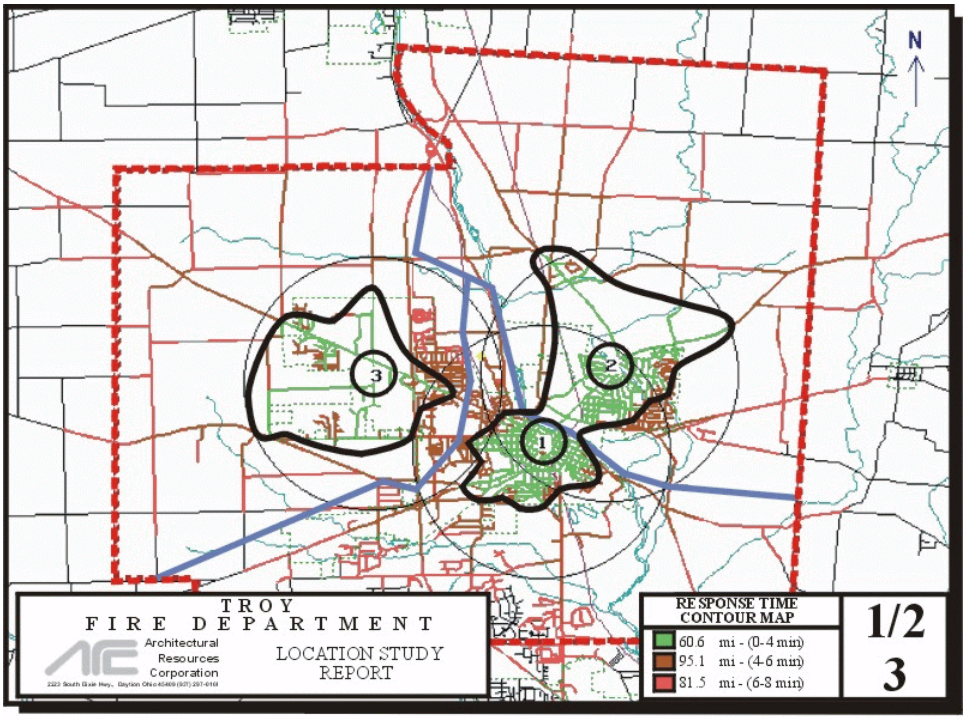
Second, Figure 10 illustrates the four (4) minute "travel distance", without adjustments for dispatch and scramble delays. This Figure 10 map also shows the four (4) minute travel distance based on the Department's current operational practice of travel speeds and stops. Since most urban communities are adopting operational rules to prohibit travel over the speed limit under normal conditions, we have also included the necessary adjustments to reduce speeds to the actual posted speed limits in the community. Since the total "response time" is what is considered for four (4), six (6) and eight (8) minute response times, we must consider the dispatch and scramble delays in calculating the response areas. The resulting travel time and response area is consequently reduced by approximately one and one-half (1.5) minutes in addition to the speed change.

The resulting response area, after being adjusted for the dispatch and scramble delay, is shown on the Figure 11 map. This map, although illustrating a significantly smaller response area, is the critical base data map for this study. This map most accurately represents the normal response area within four (4), six (6) and eight (8) minutes from the existing Station #1. Figure 12 illustrates the combined areas of all three existing stations. This combined response area is based on normal dispatch and scramble delays, with emergency apparatus traveling at normal, acceptable speeds, as the community continues to grow with increasing traffic and congestion.



FIRE RESPONSE - EXISTING STATION SITE 1
(WITH 1.5 MINUTE DELAY)

Figure 11



FIRE RESPONSE - EXISTING STATION SITES 1/2/3
(WITH 1.5 MINUTE DELAY)

Figure 12

The other maps enclosed in this report illustrate existing conditions and response areas, as well as proposed station configurations and their respective response areas. The site numbers noted on the maps are not intended to represent

station numbers, but to identify discreet separate station sites for this study.

CONNECTOR ROADS

Many rural areas of communities are often developed with an initial radial pattern of streets and roads. As the community grows and develops, areas are in-filled between these roads, but are often not inter-connected or not connected in an effective way. Development of connectors is important for effective traffic flow around a community and to minimize problems of congestion in core areas. Although we have yet to find a situation where connector roads eliminated the need for the basic number of fire stations in the community, they do play a very significant role minimizing the need for additional or redundant stations due to barriers, and they do provide redundant travel options to get to an emergency scene.

As various site and site combinations are studied and simulated, consideration is given to the effect of suggested connectors which can affect the overall response effectiveness from any given site. In review of the simulation studies that we performed, most existing developments have redundant connectors. There is, however, one new development in the southwest area of Troy that lacks this backup.

STRATEGY

The strategy used in the development of this plan is based on improving self sufficiency in fire and EMS services within the community first. It is also to look at how, over time, the service can be maintained and improved. The strategy is also to enhance the community's ability to participate in mutual aid and automatic mutual aid to surrounding communities as appropriate, or as formally and legally agreed to between the communities with minimum impact on your Fire District. This strategy considers ISO and NFPA guidelines as well as other risk management techniques in the community. Maintaining controls on

the existing housing stock and code compliance with business facility development in the area will result in a minimal degradation from multiple calls. These other risk management techniques include public and crew education and training, zoning, building and inspection s which include the Fire Department's fire prevention services.

Other elements that affect the station location strategy are the off-station-recycle-time, redundancies, and dynamics of each station's district response areas. The time it takes equipment and crews to return from a call to be on station and ready for the next call is an important consideration. This off-station-recycle-time is the duration of time that a station cannot respond with a specific service or equipment due to its being on a current call. Two things will affect the recycle time in this community. One is industry trends that affect the way in which services are provided in the field and the time it takes to perform these services. The other is a change in the type of calls that are received that can also affect the time off-station. Changes in emergency medical care delivery and redistribution of health care facilities may increase the off-station time for emergency medical services.

Redundancy of capability is the means available to respond to extensive off-station-recycle-time, multiple simultaneous calls or high levels of activity involving mutual aid or automatic mutual aid. The redundancy of facilities, equipment and manpower helps to maintain the desired response times within the community. The response dynamics in the area also affect the decisions of where facilities are to be located.

The travel time within any station's response area is significantly affected by time cycles. The daily cycles of traffic and congestion, weekly cycles of business and leisure activities and the seasonal cycles affecting weather conditions all work together to change the areas that can be covered within target times. In fact, the degradation of a normal, four (4) minute response area can be severe during rush hour traffic in poor weather conditions. This, unfortunately, is also when calls for emergency services often increase.